

BOOK REVIEW

**NUMERICAL MODELS IN GEOMECHANICS, G. N. Pande and
S. Pietruszczak (Editors), ISBN: 90 5410568 2, 706 pages,
Publisher: A. A. Balkema, Rotterdam, 1995.**

This book is the proceedings of the fifth international symposium on numerical models in geomechanics (NUMOG V), which was held in Davos, Switzerland in September 1995. The proceedings include 109 papers covering many important topics related to numerical modelling in geomechanics. The book is divided into six major sections under which papers are grouped together according to subject matter. These sections are:

1. Constitutive relations for geological materials: formulation and verification (23 papers).
2. Instability and strain localization in geomaterials (12 papers).
3. Modeling of reinforced soil (4 papers).
4. Modeling of transient/coupled problems:
 - 4.1. Thermo/hydro-mechanical coupling (7 papers).
 - 4.2. Flow through porous media (4 papers).
 - 4.3. Environmental geomechanics (5 papers).
5. Numerical algorithms: Formulation and performance (12 papers).
6. Application of numerical techniques to practical problems:
 - 6.1. Tunnels and underground structures (6 papers).
 - 6.2. Slopes and embankments (6 papers).
 - 6.3. Piles and foundations (11 papers).
 - 6.4. Other applications (12 papers).

Papers included in Section 1 cover topics such as finite deformation theory for a cam clay model, creep behaviour of rock salt, hypo-plasticity, elasto-plastic model with damage, formulation and algorithmic aspects of an elasto-plastic model, mechanical behaviour of partially saturated and unsaturated soils, mechanical properties of fractured rocks, micro mechanical analysis, cyclic elasto-plastic models for sands, kinematic hardening, anisotropy in the shape of the yield surface, physico-chemical interactions between clay particles, viscoplasticity, initial and induced anisotropy, and determination of material properties for non-associated models.

Section 2 deals with the instability and strain localization of geological materials. This section covers topics such as shear band localization, stability, instability, uniqueness, bifurcation analysis, effects of strain localization, and numerical aspects of modeling of strain localization. This section is highly focussed and included a thorough coverage of the topic.

Section 3 deals with numerical and theoretical aspects of modelling reinforced soils and earth walls. It also includes a paper on sand compaction piles.

Section 4.1 deals with modelling of transient and coupled problems. Topics in this section include application of distinct element model (DEM) for evaluating the thermo-mechanical response, finite element solutions for a thermo-hydro-mechanical problem, centrifuge modelling, thermal analysis for soils using finite element method, analysis of cycling mobility, and prediction of frost heave and seasonal ground movements.

Sections 4.2 and 4.3 include papers dealing with flow through porous media, flow in partially saturated soils, contaminant transport modelling, and environmental geomechanics.

Section 5 deals with numerical algorithms, uncoupling of coupled flow problems, displacement discontinuity method, analytical and numerical treatment of indentation problems, coupled heat and moisture transfer in soils, computation of collapse load using mixed finite elements, applications of finite element method in thermo-mechanics, and application of neural networks.

Section 6 covers a wide variety of topics dealing with applications of numerical techniques to practical problems. These include applications in tunnels and underground structures, slopes and embankments, piles and foundations and several other practical problems.

In summary, the book covers a wide range of topics dealing with numerical models in geomechanics and recent developments in these areas. The applications covered in the book serve

as a bridge between recent developments and the practice of geotechnical engineering. The book also contains an author index, which is very useful. This book would be an excellent addition to the collection of students, researchers and practitioners involved with numerical modeling in geomechanics.

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